Abstract

Novel multilaminated nano-engineered devices and methods of forming multi-layer devices that exhibit quantum-confinement effects are disclosed. Benefits of multi-layer sensing, piezoelectric, photonic, biomedical, and thermal devices based on nanomaterials are disclosed. Quantum-confined device layer thickness can be in the range of 1 nm to 10 cm, a preferred thickness being less than 10 microns, and a most preferred thickness being less than 1 micron. Devices can be built using chalcogenides, oxides, nitrides, borides, phosphides, halides, silicates, hydrides, oxynitrides, oxycarbides, and other complex compositions. Sensors for monitoring environmental variables such as chemical composition are disclosed. These low-cost sensors comprise multiple layers in a laminated stack. Very high numbers of sensing layers (*e.g.,* 500) may be incorporated into a single laminated sensor device. The sensors may be produced from nanostructured materials. Additionally, multi-layer magnetic, optical, photonic